Special Report   2011/07

The Rabo Sovereign Vulnerability Index

After the dismal failures of the financial markets to correctly price sovereign risk before the crisis, one must be aware that they can still over-or underprice sovereign risk in some countries. To this end, we constructed a Sovereign Vulnerability Index that measures sovereign risk in an 'objective' and mechanical way. Our results show that Greece, Japan, Portugal, Ireland and the US are the most susceptible to a debt crisis.

Are markets correctly pricing risk?

Sovereign risk in all OECD countries has been re-priced in the financial markets (see figure 1) amid massive deterioration of public finances. According to CDS spreads, market participants believe that the eurozone periphery have the highest probability of default. But is this correct? Is it possible that investors overprice sovereign risk in some countries while underpricing it in others? To be able to answer this question, we have constructed a composite indicator –the Rabo Sovereign Vulnerability Index (SVI)– to establish an 'objective' and measurable framework for measuring fiscal risks. More specifically, we wish to rank the major advanced economies from most to least vulnerable to a sovereign debt crisis based on a number of indicators.

We should note that this exercise is not flawless. By selecting a set of indicators and ex-

cluding others and by aggregating different types of risks in the SVI, some information is lost. Moreover, the absence of a strong theoretical base regarding the weights of each indicator forces us to give equal weighting to each indicator. Hence this might be too simplistic given that some variables are perhaps more important when it comes to assessing a country's vulnerability to sovereign debt crisis. That said, the SVI can help us summarise abundant information in an objective manner and, for this reason, is deemed as a useful tool for screening sovereign risk across countries.

Introducing the indicators

After looking at a host of variables, we settled on eight indicators. We attempted to take the 2011 forecasts for variables that international organisations make available. Otherwise, the most recent figures are used. The graphs of all the used statistics can be found at the end of this publication (figure A).

1. The interest-growth differential

The change in public debt-to-GDP ratio (hereafter debt ratio) is dependent on the government's primary deficit (i.e. budget deficit excluding net interest payments), the stock-flow adjustment[1] and the gap between nominal GDP growth and debt servicing costs[2]. The latter is referred to as interest-growth differential or snowball effect and is particularly relevant in debt sustainability analyses. This is because the bigger the snowball effect, the more difficult it is for the government to reduce the debt

Figure 1: Sovereign risk is re-priced
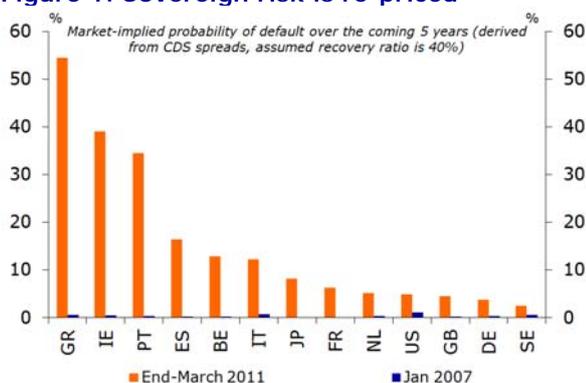
Source: Bloomberg, Rabobank

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[1] Reflects the accumulation of financial liabilities (e.g. due to banking sector support), changes in the value of debt denominated in foreign currency and remaining statistical adjustments.

[2] $d_{t+1} - d_t = pd_{t+1} + (r_{t+1} - g_{t+1}) \times d_t + SF_{t+1},$

d is the debt ratio, *pd* is the primary deficit, *r* is the government bond yield, *g* is nominal GDP growth rate, *SF* is the stock-flow adjustment and *t* is the period.

ratio to more prudent levels even if there is a huge correction in the primary balance. To determine the snowballing risk, we need to make an assumption about the growth and interest rate outlook for every country over a given horizon. For ease of analysis, we take the 2011 and 2012 forecasts of the OECD.

2. The cyclically adjusted primary balance (% of potential GDP)

A large primary deficit does not necessarily increase sovereign risk if it is due to a weak macroeconomic backdrop. Once the recovery takes hold, the primary balance automatically improves. However, there are times when a large portion of government revenue is lost for good (or at least for a protracted period). This can be the case in the aftermath of a housing market bust and/or collapse of the bloated financial sector. As such, the cyclically adjusted primary deficit (CAPD) is more relevant from a risk perspective because the larger the CAPD, the more painful the required fiscal adjustment. In other words, the government cannot rely on economic growth to lower the primary deficit. Austerity measures will still be needed.

3. Interest payments (% of gov. revenue)

As far as debt affordability is concerned, interest payments on government debt (as a share of total government revenue) are the single most important indicator to monitor. This measure, namely, reflects the share of the budget that is devoted to servicing debt interest payments and will, by and large, determine whether the markets believe that governments *can* and *will* continue to service their interest obligations. If rising risk premia and debt levels make interest payments so big that debt servicing crowds out a large part of the public budget, the government might find it worthwhile to default on its debt.

4. Net public debt (% of GDP)

Periodically, governments need to finance their primary deficits and the interest payments on the continuing stock of gross debt. In addition,

they need to cover financing needs associated with the turnover of the maturing portion of their debt. In normal times this process is not a headline-grabbing event. Yet in times of sovereign stress, investors pay special attention to the amount of new debt issuance that needs to be digested by the financial markets.

In case bond investors show less appetite in purchasing the new issuances at the going interest rate, authorities will be forced to either (i) raise the yields to uncomfortably higher levels to make the bonds more attractive to hold (i.e. their long run insolvency comes under question), (ii) go cap-in-hand to the IMF or other governments with deep pockets for financial support or (iii) sell their financial assets to service their debt. With regards the latter, it is important to mention that governments' net public debt, which is the value of gross public debt less gross public financial assets, can also paint an overly optimistic picture since authorities may run into difficulty if they wish to liquidate their assets immediately to meet outstanding liabilities. That said, net public debt gives a clearer picture of a government's indebtedness, in our view, than the usual gross figures used by financial experts, which takes no account of the government's assets (especially relevant in the case of Japan, figure A4).

5. Weighted average years to maturity

Of particular relevance during sovereign turmoil is the frequency of rolling over maturing debt (i.e. even if the budget is balanced). If a large chunk of the outstanding debt will be maturing in a short period, then investors might be less willing to digest it at the going interest rate, potentially triggering a liquidity crisis. Even if the government manages to issue new debt at higher interest rates, the government's debt affordability will be quickly brought into question due to higher frequency of refinancing. Hence, the weighted average years to maturity of the public debt is extremely important for assessing sovereign risk.

6. External debt (% of GDP)

Greater exposure to foreign funding can also be a risky strategy for fiscal policymakers. Historical evidence shows that the share of public debt in foreign hands tends to be a good predictor of liquidity crisis because 'footloose' foreign investors rush quicker for the exit when panicked in comparison to their domestic counterparts. An important reason is that foreign investors usually have less knowledge of a country's 'true' macro fundamentals (i.e. they suffer from asymmetric information problems). What's more, governments are usually reluctant to default on their debt if it is held by domestic residents because of the severe macro-economic and political repercussions.

7. Current account balance (% of GDP)

If there is one important lesson we learnt during the current crisis in the eurozone it is that budgetary discipline is not always the best leading indicator for impending debt crisis. For example, Spain and Ireland were the poster children for responsible fiscal policy before the crisis. The countries did not post large budget deficits in the years leading to the crisis (see figure 2) and their debt ratios in 2007 were among lowest in the EMU. With the benefit of hindsight, we know that the debt that was accumulated by the private sector, financed by foreign investors, was the key ingredient in Spain and Ireland's crisis. So once the private sector had to be bailed out, private sins became public problems.

Figure 2: Sectoral financial balances
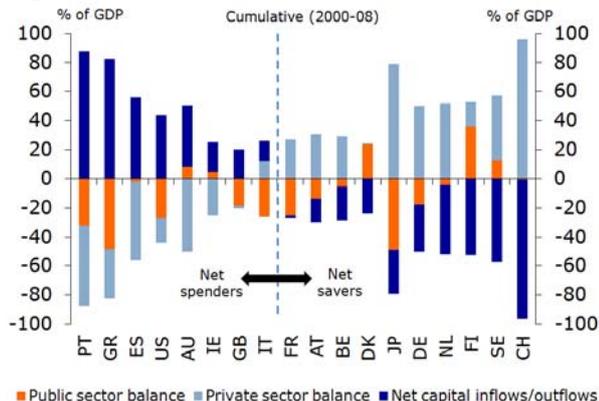
Source: OECD, Rabobank

As such, monitoring current account (CA) balances is essential in assessing contingent liabilities for the public sector. Furthermore, a CA deficit in combination with a budget deficit makes the government dependent on foreign investors for refinancing its debt since the available domestic private savings are insufficient to absorb the newly issued debt.

8. The Worldwide Governance Indicator (WGI)

The WGI of the World Bank captures six key dimensions of governance[3] between 1996 and 2009. The reason why the WGI is added to the SVI is because it is considered a proxy for the government's *credibility, ability and willingness* in carrying out the needed measures to restore order to its public finances. For example, this indicator may capture the fear of investors concerning 'untrue' official statistics and/or the power of the state to fight tax evasion.

A discussion of our findings

Once the variables are selected, we construct a z-score in order to be able to interpret the countries' relative positions. Note that the greater a country's z-score, the more vulnerable the country is to a sovereign debt crisis. To benchmark our SVI rankings, we have compared it with the markets' rankings.

When glancing through the table, a number of interesting observations catch the eye. The most noteworthy observation is that debt-ridden Japan is the most vulnerable to a sovereign debt crisis after Greece based on our estimation but not so according to the markets. The breakdown of the SVI (see figure 3) shows that Japan scores bad on all indicators except the CA balance and external debt. Portugal and Ireland are next in line mostly due to their very high snowballing risks. Interestingly, the large structural deficit of the US puts it ahead of Spain and Italy in our SVI, which is not the

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[3] Voice and accountability, political stability and lack of violence, government effectiveness, regulatory quality, rule of law, and control of corruption.

case according to the CDS spreads. Our SVI shows that we can be less concerned about Spain and Belgium than investors are in the financial markets, but we are very much in agreement about Italy.

Rabo Sovereign Vulnerability Index (SVI)

	Average Z-scores	Ranking based on	
		CDS spreads	SVI
Greece	12.04	1	1
Japan	4.77	7	2
Portugal	4.73	3	3
Ireland	4.32	2	4
US	4.16	11	5
Italy	3.37	6	6
Spain	2.57	4	7
Belgium	0.53	5	8
France	0.33	9	9
UK	-1.03	12	10
Austria	-1.39	8	11
Netherlands	-2.46	10	12
Australia	-2.71	12	13
Germany	-3.05	13	14
Finland	-4.67	15	15
Denmark	-6.51	17	16
Switzerland	-7.42	14	17
Sweden	-7.57	16	18

**Figure 3: The breakdown of Rabo SVI**
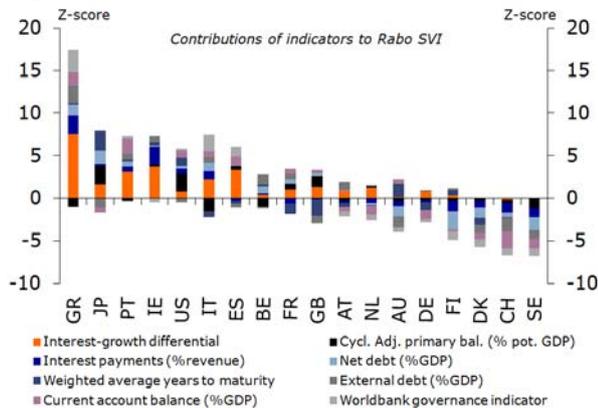
Source: Rabobank

It is also noteworthy to mention that on the other side of the spectrum, the CA surplus countries score the best, which is very much in agreement with the CDS spreads. In fact, Australia is the only country that scores relatively well while running a CA deficit. Overall, our SVI's ranking is highly correlated with the financial markets' ranking (87%). Figure 4 also shows the comparison of our SVI's ratings (z-scores) with each country's market implied probability of default (IPD) derived from each

country's CDS spreads. The comparison reveals a relatively firm relationship with a regression of our scores against those of the markets' producing an R-squared of 75%.

Figure 4: The Rabo SVI vs. CDS spreads
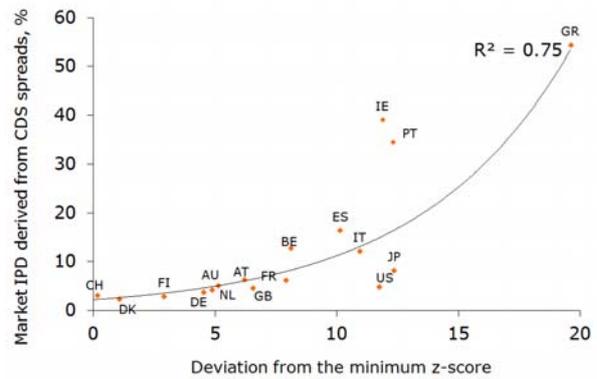
Source: Bloomberg, Rabobank

Some caveats

There are a number of limitations in this mechanical exercise. First, there is certainly the possibility that we omitted a number of important variables in our SVI. For one, we have not included explicit contingent liabilities of governments because it is extremely difficult to know *a priori* governments' risk exposures – guarantees may not be called; announced lending facilities may not be used; loans may be repaid; and assets may retain their value. The uncertain ageing-related expenditures were also left out. Second, soft fundamentals may not be correctly captured. For instance, the SVI cannot account for the fact that the dollar's role as a reserve currency will help the US to fund its deficit for much longer than most other countries. The SVI also cannot measure the economic and political costs of default, which can vary per country. The higher the perceived costs of default, the more willing the government will be to take all necessary measures to avoid default (see Rabobank Special: To default or not to default – April 2011).

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Figure A: The selected indicators in the SVI

1. Interest-growth differential (2011-2012)

5. Weighted average years to maturity (March-2011)

2. Cyclically adjusted primary balance (2011)

6. External debt (2010-Q3)

3. Gross interest payments (2011)

7. Current account balance (2011)

4. Public debt (2011)

■ Gross debt ■ Net debt (gross debt minus gross financial assets)

8. World Bank governance indicator (2009)

Source: OECD, IMF, BIS, World Bank, Bloomberg, Rabobank